CLAIMS

1. An apparatus for applying and releasing a clutch piston in a clutch cylinder, the apparatus comprising:

a fill oil chamber having first and second portions separated by a fill piston, said first portion being a fluid communication with the clutch cylinder through a first passage, and said second portion being in fluid communication with a second passage;

a third passage in fluid communication with the first passage; and

a fill control valve operative to alternately communicate the second passage to a transmission line pressure passage or an exhaust passage, and further operative to alternately communicate the third passage to a controllable source of pressurized oil having a signal pressure or to close the third passage.

2. The apparatus of claim 1, wherein said fill control valve comprises a double spool valve biased by a spring.

3. The apparatus of claim 1, wherein said third passage is connected to the first passage through an orifice.

4. The apparatus of claim 1, wherein said fill oil chamber is positioned below the lowest sump level of a transmission in which the apparatus is positioned.

5. The apparatus of claim 1, further comprising a snubber formed in the fill oil chamber to cushion movement of the clutch piston when applying the clutch piston.

6. The apparatus of claim 1, wherein the apparatus is operative to switch between application of line pressure or signal pressure to the clutch piston to cause a rapid, controlled application and release of the clutch piston.

7. A method for applying and releasing a clutch piston in a clutch cylinder, the method comprising:

providing a source of transmission line pressure;

providing a controllable source of pressurized oil having a signal pressure; and

alternately communicating the clutch cylinder with the source of transmission line pressure and the controllable source of pressurized oil to control application and release of the clutch piston.

8. The method of claim 7, wherein said step of alternately communicating comprises, when applying the clutch piston, communicating said source of transmission line pressure with the clutch cylinder via a fill piston until the fill piston bottoms out, and then communicating said controllable source of pressurized oil to the clutch cylinder to cause a smooth, controlled clutch application.

9. The method of claim 8, further comprising controlling said controllable source of pressurized oil to control the normal force on a clutch pack applied by the clutch piston during applying, holding and releasing of a clutch.

10. The method of claim 9, further comprising reducing pressure of said controllable source of pressurized oil to enable a spool valve spring to move a spool valve to exhaust pressure from the clutch cylinder and allow a clutch return spring to move oil from the clutch cylinder to a fill oil chamber to be available for the next apply stroke.

11. A method for applying and releasing a clutch piston in a clutch cylinder, the method comprising:

providing a source of transmission line pressure;

providing a controllable source of pressurized oil having a signal pressure;

communicating said source of transmission line pressure with the clutch cylinder via a fill piston until the fill piston bottoms out;

thereafter communicating said controllable source of pressurized oil to the clutch cylinder to cause a smooth, controlled clutch application; and

controlling said controllable source of pressurized oil to control the normal force on a clutch pack applied by the clutch piston during applying, holding and releasing of the clutch pack.